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Fire Stimulated Aspen Sprouting in a Spruce-Fir Forest in New Mexico

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Data from a burned area in the spruce-fir type, the Walker Burn, indicate that burning significantly increases aspen density for about 4 years. After that, the number of stems per acre declines, and the aspens begin to grow out of reach as browse for elk and deer.
(KEY WORDS: Populus tremuloides, wildlife food plants, forest fire behavior)

In southwestern United States, one of the preferred foods for deer and elk is aspen stems and leaves.[3,4]

A wildfire in April 1963 presented an opportunity to study fire as a technique to stimulate aspen sprouting. The fire, named the "Walker Burn," burned over 300 acres in the spruce-fir type on the Santa Fe National Forest, New Mexico (fig. 1).

The spruce-fir type at the Walker Burn had an overstory of quaking aspen (Populus tremuloides Michx.), Engelmann spruce (Picea engelmannii Parry), Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco), and ponderosa pine (Pinus ponderosa Lawson).

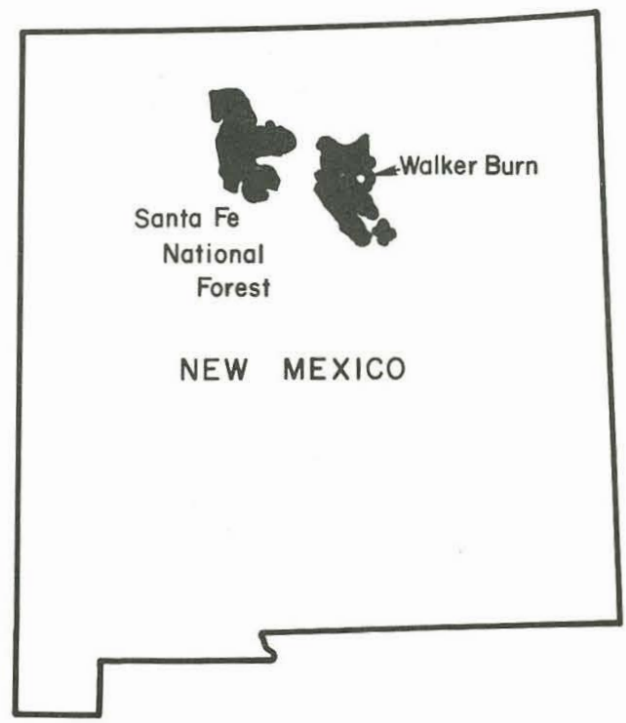

Figure 1.--Location of the 300-acre Walker Burn on the Santa Fe National Forest in New Mexico.

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[3]*Wallmo, O. C., and McCulloch, Clay. Influence on carrying capacity of experimental water conservation measures. Job Completion Rep. W78R7-WP5-J7, 12 p., illus. In Wildlife research in Arizona, 1962. Ariz. Game and Fish Dep. [Phoenix, Ariz.]*

[4]*Lang, E. M. Elk of New Mexico. N. Mex. Dep. of Game and Fish Bull. 8, 33 p. 1958.*

Understory vegetation consisted mainly of willow (Salix spp.), New-Mexican rose (Rosa neomexicana Cockrell), Oregongrape (Mahonia repens (Lindl.) G. Don), geranium (Geranium spp.), strawberry (Fragaria spp.), shrubby cinquefoil (Potentilla fruticosa L.), filaree (Erodium cicutarium (L.) L'Her.), sedge (Carex spp.), and nodding brome (Bromus anomalus Rupr.).

Deep litter on the area helped maintain a hot ground fire that consumed all the understory hardwoods and conifers. Heat completely defoliated the overstory; a few trees have recovered, but many dead snags remain.

Research on the influence of fire on aspen has shown sprouting to be related to fire intensity. "A moderate burn, one which kills the tree canopy and undergrowth and eliminates the litter and part of the duff, will most effectively stimulate suckering. Lesser intensities of burning will produce less dense and vigorous suckers."[5]

This Note reports how fire stimulated aspen sprouting, and how forest managers might use fire to provide aspen browse for deer and elk.

[5]*Horton, K. W., and Hopkins, E. J. Influence of fire on aspen suckering. Dep. Forest., Can. Publ. 1095, 19 p., illus. 1965.*

Methods

In August 1964, 18 months after the fire, 1 acre on the Walker Burn was fenced to exclude cattle. Twenty 0.01-acre plots were established within the burned area; 10 inside the exclosure and 10 outside. Aspen sprouts were photographed and counted five times on each of the 20 plots—September 1964, and each June, 1965 through 1968.

Results

Fire significantly increased the number of aspen sprouts on the Walker Burn. The 5-year average density was 12,960 sprouts per acre on the burned area, compared with 100 in the adjacent unburned forest, and 200 to 500 in a similar spruce-fir type in Arizona (table 1).[6,7]

[6]*Reynolds, Hudson G. Aspen grove use by deer, elk, and cattle in southwestern coniferous forests. U.S.D.A. Forest Serv. Res. Note RM-138, 4 p., illus. 1969. (Rocky Mt. Forest and Range Exp. Sta., Ft. Collins, Colo.)*

[7]*Patton, David R. Deer and elk use of a spruce-fir type before and after a timber harvest. 1969. (Unpublished data on file at Rocky Mt. Forest and Range Exp. Sta., Tempe, Ariz.)*

Table 1.--Number of aspen sprouts per acre on the Walker Burn, Santa Fe National Forest, New Mexico, compared with unburned aspen areas in the spruce-fir type

Date data were collected	Walker Burn			Unburned areas		
	Inside exclosure	Outside exclosure	Average	Adjacent to Walker Burn[1]	Apache National Forest, Arizona	
					Aspen groves	Willow Creek
	- - - - - - - - - - - - Number per acre - - - - - - - - - - - -					
1964 (September)	10,500	13,100	11,800	100	--	--
1965 (June)	12,600	15,100	13,850	--	--	--
1966 (June)	13,700	15,400	14,550	--	--	--
1967 (June)	12,100	13,400	12,750	--	200	--
1968 (June)	11,200	12,500	11,850	--	--	--
1969 (August)	--	--	--	--	--	500
Average	12,020	13,900	12,960	100	200	500

[1]Estimated--no actual counts made.

Livestock and wildlife use on the burned area did not significantly affect aspen density; the number of sprouts was similar inside and outside the exclosure.

Sprouts increased on the burned area each year to 1966 when the density was 14,550 per acre. Then the number of stems began to decrease until 1968 when the per-acre density was 11,850.

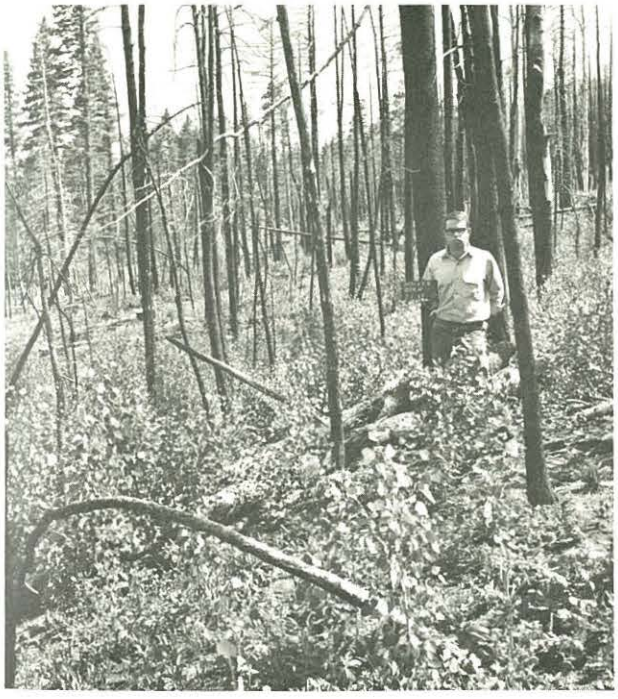
In 1964, the aspen sprouts were less than 3 feet tall, so elk and deer could browse them easily. By June 1968, however, the sprouts were 8 to 10 feet tall and getting out of reach as a food supply (fig. 2).

Conclusions

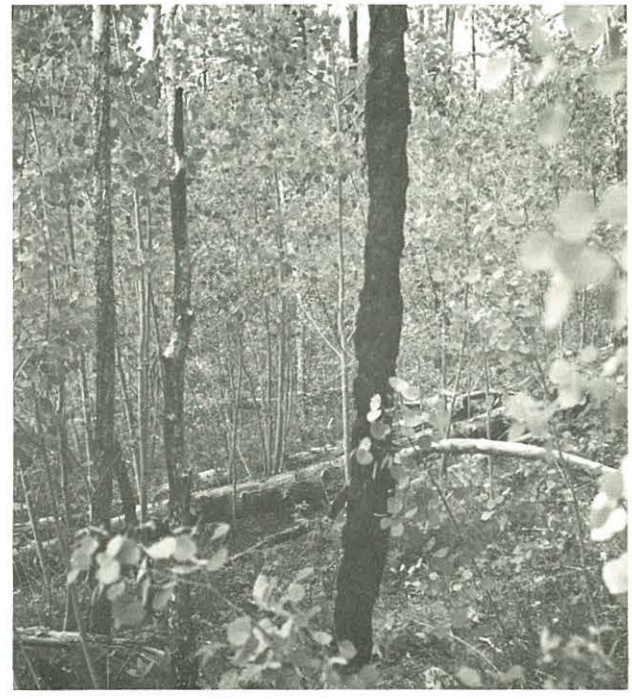
Although data are from only one burned area in the spruce-fir type in the Southwest, the 300-acre Walker Burn, indications are that:

1. Fire stimulates aspen sprouting and may be an effective tool in producing browse for deer and elk.
2. Aspen-sprout density increases for about 4 years following a fire, then the number of stems per acre begins to decrease.
3. Six to eight years after a fire, the majority of aspen sprouts may be 8 to 10 feet tall and will no longer be in reach for deer and elk to use as browse.

Figure 2.--Aspen sprouts after 1963 wildfire in spruce-fir type, Santa Fe National Forest, New Mexico (same camera point):



September 1964--
Aspen browse not over 3 feet tall; plentiful, tender, and succulent food for deer and elk.



June 1968--
Aspen sprouts, 8 to 10 feet tall; leaves and twigs nearly out of reach as a food supply.

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